Chapter 6
Mammoth Dams, Lean Neighbours: Assessing the Bid to Turn Ethiopia into East Africa's Powerhouse[1]

Iván Cuesta-Fernández

Introduction

The Ethio–Djibouti Railway, inaugurated in 1917, not only crowned the modernisation project espoused by Emperor Menelik II. It also drastically eased the hauling of bulk quantities of Ethiopian coffee beans to a nearby port. Accordingly, sales abroad quadrupled in 10 years and coffee managed to prevail over other export commodities throughout the course of the twentieth century. Yet one century after the inauguration of the Ethio–Djibouti Railway, the primacy of coffee may now soon come to an end. The Ethiopia–Kenya Electricity Highway, to be completed in 2017, is expected to boost revenues from electricity exports to $1 billion per year by 2020 (AfDB 2012a; World Bank 2012a).

Cross-border power connections constitute but one component of an ambitious programme first initiated in 2005. Domestically this programme also promises to deliver universal access to electricity by 2023. The principal aspect of it though is a massive expansion of the generation fleet. So far, with the recent addition of three medium-sized hydropower plants – that is, Gilgel Gibe II (420 megawatts (MW)), Tana Beles (460 MW) and Tekeze (300 MW) – the installed capacity in 2010 became already treble that of 2005. Up to 27 more dams, totalling almost 25,000 MW, are projected to see the light

1 As the only contributor whose paper was not discussed at the panel on 'A New Scramble for Africa?: The Rush for Energy Resources Southwards of the Sahara', held at the 5th European Conference on African Studies, I am particularly grateful for the editor's invitation to contribute to this volume as well as for his reviews of the first and second draft of this chapter.

of day before 2027 (World Bank 2012a). The apex of dam building will be reached with the completion in 2017 of Africa's largest hydropower complex: the Grand Ethiopian Renaissance Dam (GERD), which, according to the Ethiopian authorities, is forecast to generate a peak amount of 6,000 MW. More conservatively, the World Bank (2012a) lowers its expected capacity to 5,250 MW. Even abiding by the latter figure the GERD alone will account for more than 40 per cent of the installed generation capacity in the country. Such a massive breakthrough will nevertheless be preceded in 2015 by another grandiose dam project, Gilgel Gibe III (1,870 MW), now under construction. When commissioned Gilgel Gibe III will contribute more than 20 per cent of the country's electrical output.

All in all, forthcoming generation facilities will already by 2017 have increased Ethiopia's production capacity to a level more than three times above that of the country's domestic demand. Ethiopia is therefore now faced with a pressing need to step up the creation of cross-border links – for example the interconnector with Kenya – in order to cash in on the surplus of energy and thus be able to repay the loans borrowed. Predicated upon an analogue line of reasoning, the connections to Kenya are also being devised so as to facilitate future exports to the Eastern African Power Pool (EAPP). Yet the 'march of the pylons' championed by Ethiopia stretches in every possible direction: towards Djibouti, Kenya, Somaliland, South Sudan, Sudan and even henceforth to new markets as far afield as South Africa, Yemen and eventually Europe (EEPCo 2012).[2] The both domestic and regional relevance of the Ethiopian electrification scheme is therefore difficult to overstate.

Accordingly, this chapter sets out to discuss its main features as well as the key steps towards its implementation. Doing so also allows its potentialities and pitfalls to be assessed. The analysis stems from the review of the policies enacted by the Ethiopian authorities, the reports associated with the projects implemented by the African Development Bank (AfDB) and the World Bank, as well as of articles from regional newspapers. For a better understanding of the whole proposed electrification scheme, which spans a timeframe running from 2005 to 2023, I differentiate between three phases, each of them predicated upon a characteristic balancing of a triad of components – namely generation, exports and domestic access. In the first section of this chapter I analyse the past and present stages of the scheme (2005–2011 and 2012–2017), highlighting their respective emphasis on generation and

2 The term 'march of the pylons' is borrowed from Luckin's (1990) book on electricity and the environment in Britain during the interwar period. Luckin uses it to capture Britain's relentless efforts to roll out electricity across the country, which somewhat resembles Ethiopia's own ambitious electrification scheme.

domestic access. The second section touches upon the upcoming third phase (2018–2023), underscoring its focus on the exports component. I analyse the probability of exports of Ethiopian electricity occurring to the three major markets of Egypt, Kenya and South Africa, and arguably also to Yemen as a fourth one. I posit that those markets that are more within reach in the medium term than Egypt and South Africa are also substantially smaller and marked by some uncertainties – namely Djibouti, the Democratic Republic of the Congo (hereafter the DR Congo), Rwanda, Somaliland, South Sudan, Sudan, Tanzania and Uganda. In the third section I highlight the potential pitfalls of Ethiopia's electrification scheme – meaning likely environmental and financial obstacles.

Overcoming a Century of Electric Scarcity

Back in 2001 the ruling Ethiopian People's Revolutionary Democratic Front could hardly point to a single accomplishment having been made in the country's power sector. Access to electricity had merely increased from 10 to 13 per cent of Ethiopian households since the early 1990s (World Bank 2013). Basic calculations based on data from the United Nations Population Division and the World Bank show that per capita consumption remained 12 times below the Sub-Saharan average (South Africa excluded).[3] Generation capacities, meanwhile, amounted to 543 MW – less than those of Mauritius. Even five years later progress was still negligible. With only 17 per cent of the population living in electrified areas, five out of six Ethiopians continued to lack access thereto (World Bank 2013). Rural populations almost without exception were kept in the dark, particularly in the lowlands. For those connected to the national grid, load shedding exercises and blackouts became almost a daily routine. As a result, suppressed demand deprived the Ethiopian Electric and Power Corporation (EEPCo) of earnings amounting to $0.52 per kilowatt-hour, more than ten times the existing average tariff (World Bank 2012b).

In 2005 though, new annual grid connections exceeded 100,000 for the first time. That same year the updated Ethiopian Power System Expansion Master Plan (EPSEMP) enshrined the goal of putting a permanent end to electricity scarcity. The EPSEMP 2006–2030 specified two chief objectives: expanding both access and consumption per capita, as well as overcoming electricity shortages by generating a massive surplus of cheap electricity that

3. The according data is available online at: http://esa.un.org/undp/wpp/index.htm [accessed 25 September 2014]; and at: http://data.worldbank.org/indicator [accessed 25 September 2014].

was also suitable for export. Access was set to increase to 75 per cent by 2016, domestic demand to double in five years and nine countries to become potential buyers of electricity generated in Ethiopia: Djibouti, Egypt, Eritrea, Kenya, Somalia, Somaliland, South Sudan, Sudan and Yemen. The EPSEMP 2006–2030 even mentioned the prospect of making exports to Europe, either through Morocco or Turkey (EEPCo 2006).

Domestically, rural electrification and the intensification of urban grid connections also benefitted from the establishment in 2005 of the Universal Electricity Access Programme and the Rural Energy Agency. The latter in particular contributed to developing mini-hydro schemes in areas untouched by the national grid. Accordingly, household access to electricity had increased to 45 per cent by 2011. What is more, as mentioned earlier, three medium-sized hydropower plants went online in 2009 and 2010: Gilgel Gibe II (420 MW), Tana Beles (460 MW) and Tekeze (300 MW). In 2011 wind energy entered into the national grid for the first time. The EPSEMP 2006–2030 had already by the end of 2010 succeeded in generating a surplus of electricity for the domestic market, although it amounted to a tiny one of 1 per cent of the aggregate demand. This was achieved partly thanks to the two-year partial moratorium on new grid connections that was imposed by EPPCo in 2008 (World Bank 2012b). Consequently, by 2011 power shortages in Ethiopia had become a thing of the past.

The first phase of the electrification scheme also witnessed the beginning of electricity exports. The interconnections with Djibouti and Sudan were commissioned in 2011 and 2012 respectively. With electricity costs above $0.10 per kilowatt-hour in Djibouti and Sudan, these cross-border connections made economic sense. The AfDB volunteered to finance the interconnector to Djibouti, featuring a peak exchange capacity of 180 MW. A price of $0.07 per kilowatt-hour was agreed, thereby setting the maximum revenue brought in at slightly above $50 million per year. Regrettably, in the first 12 months of operation EEPCo merely cashed in $14.6 million, thus revealing earlier forecasts as having been too optimistic (AfDB 2012b). One year later the price for electricity sales to Sudan was set to a lower figure of $0.05 per kilowatt-hour. Yet again actual earnings fell short of the target amount, being less than $10 million in the first year. The low earnings from exports to Sudan were partly due to the two sides' differences on pricing. These differences led to a discontinuation of the service between April and June 2013. Trade only resumed after the Sudanese government had promised to consider an increase in the price to on a par with Djibouti's rate.

During the currently ongoing second phase of the electrification scheme (2011–2017) two new priorities have emerged: the massive expansion of

the generation capacities and the laying of the first major international interconnection, the Ethiopia–Kenya Electricity Highway. These new focuses followed again a policy update made earlier in this decade. In 2011 a renovated Power Sector Development Programme (2010–2015) was issued (EEPCo 2011). It is a part of the EPSEMP 2012–2037 (EEPCo 2012). Likewise, a comprehensive National Energy Policy was published in 2013, coherent

Table 6.1 Ethiopia's existing and envisaged power stations of at least 100 MW

Name	Type	Year of commissioning	Capacity in MW
Fincha'a	Hydropower	1973	134
Melka Wakena	Hydropower	1988	153
Gilgel Gibe I	Hydropower	2004	192
Tekeze	Hydropower	2009	300
Tana Beles	Hydropower	2010	460
Gilgel Gibe II	Hydropower	2010	420
Ashegoda	Wind power	2014	120
Helele Werabesa	Hydropower	2015	422
Chemoga Yeda	Hydropower	2015	278
Genale Dawa III	Hydropower	2015	256
Gilgel Gibe III	Hydropower	2017	1,870
GERD	Hydropower	2017	5,250
Debre Birhan	Wind power	Under construction	100
Corbetti	Geothermal	Under development	1,000
Aysha	Wind power	Under development	300
Assela	Wind power	Under development	100
Adama II	Wind power	Under development	153
Mandaya	Hydropower	Under study	2,000
Beko Abo	Hydropower	Under study	1,700
Karadobi	Hydropower	Under study	1,600
Gilgel Gibe IV	Hydropower	Under study	1,472
Baro	Hydropower	Under study	896
Border	Hydropower	Under study	800

Note: Additional information has been retrieved from the website of the EEPCo. Available at: http://www.eepco.gov.et [accessed 25 September 2014].
Source: Kraak (2012).

Table 6.2 Electric balance of Ethiopia

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Energy production capacity		3,754	4,035	6,028	8,231	9,203	15,633	23,891	39,149	40,826	45,408
	Gilgel Gibe III						2,621	5,242	5,242	5,242	5,242
	GERD							3,324	15,177	15,177	15,177
	Wind power				390	718	1,758	1,758	1,758	1,758	1,758
	Geothermal and other thermal					644	3,414	4,465	6,307	6,278	7,753
Domestic demand		3,042	3,203	4,035	4,525	5,611	6,958	8,627	10,698	12,410	14,395
Exports to Djibouti				33	131	150	318	788	788	788	788
Exports to Sudan					197	788	1,577	1,577	1,577	1,577	1,577
Exports to Kenya											1,117
Losses		751	807	1,206	1,646	1,749	2,814	4,062	6,264	6,124	6,811
Surplus		-39	25	754	1,731	905	3,967	8,837	19,822	19,927	20,720

Note: All values herein are in gigawatt-hours, meaning that they cannot be directly compared with the various figures stated in MW elsewhere in this chapter.

Source: Adapted from a World Bank report (2012a, 121).

with the overarching Growth and Transformation Plan (Federal Democratic Republic of Ethiopia 2010, 2013). Some primary goals can be identified from these key policy documents: connecting 400,000 additional households to the national grid each year, which would push access rates from the previous total of 45 per cent in 2011 up to 75 per cent by 2016; the commissioning of Gilgel Gibe III and the GERD by 2015 and 2017 respectively; and the inauguration of the 2,000 MW interconnection with Kenya in 2017.

Gilgel Gibe III and the GERD are the largest – but by no means the only – new power stations that Ethiopia is now seeking to bring online. By substantially expanding the generation fleet, as outlined by Table 6.1, a massive surplus of electric energy is likely to be generated. Table 6.2 meanwhile aptly illustrates the potential for Ethiopian electricity exports in the coming years. Taken together with the interconnections to Djibouti and Sudan, it is estimated that the Ethiopia–Kenya Electricity Highway will accrue annual earnings of between $300 million and $400 million by 2017, likely only to increase in subsequent years (AfDB 2012a).

In fact, Ethiopian authorities persistently emphasise the notion that the GERD enshrines nothing less than the hopes of the country for development. Such an argument is largely premised upon the supposed potential of Ethiopia to generate 45,000 MW exclusively from hydroelectric power – according to a figure put forward in 1964 by the US Bureau of Reclamation Studies. Even if to this day the study has yet to be replicated, Ethiopian policymakers have still accepted that figure and pledged themselves to harnessing the largest possible amount of hydropower. Accordingly, installed capacities are to be expanded from the hitherto 2,045 MW to 11,000 MW by 2016 and to 37,000 MW by 2037 (Federal Democratic Republic of Ethiopia 2010, 2013; Kraak 2012). A note of caution is needed here, though, since the oft-quoted figure of 37,000 MW may appear breathtaking at first. Even if it were to materialise – and given that the Ethiopian population is projected to reach 155 million people in size by 2037 – the country would by then still reach only 27 per cent of South Africa's present per capita generation output.

Stepping Up Exports

The quest for attracting additional customers will be the focus of the third phase of the electrification scheme, covering the years 2017 to 2023. This is understandable given the massive energy surplus available and the need to generate earnings in order to repay the loans borrowed for the construction of dams and the extension of power lines. In this regard the favourable

geographical position of Ethiopia poses a comparative advantage given that it shares borders with seven different countries (if one counts Somaliland as an independent state). Unsurprisingly, Ethiopia has been ascribed a key role in the regional trading of electricity. This has come, for example, in the contexts of the Nile Basin Initiative – which brings together Burundi, the DR Congo, Egypt, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania and Uganda – and the North–South Transmission Corridor, considered destined to connect Ethiopia to South Africa by 2020 and to Egypt by 2040 (AfDB 2008; Economic Consulting Associates 2009).

Even though the list of potential nearby customers is extensive, only three of them qualify as first-rate candidates when taking as a rough criterion for this suitability a potential domestic demand of more than 1,000 MW: Egypt, Kenya and, most importantly, South Africa. Yemen, which is currently considering a 900 MW underwater connection (as *Tigrai Online* reported on 6 February 2014), would stand close to being a first-rate customer if such a connection were realised. Direct exchanges with the rest of the regional countries – Djibouti, the DR Congo, Rwanda, Somaliland, South Sudan, Sudan, Tanzania and Uganda – will remain small, and probably even negligible, because of their low demand and even lower purchasing power (more on these small customers later).

The feasibility of exports to South Africa largely depends on the rate of progress henceforth of a yet to be realised interconnection between Tanzania and Zambia. As shown in Chapter 5 of this volume the South African government is not foregoing chances for regional cooperation on energy. There are, however, major practical obstacles to such projects succeeding. Therefore, South Africa's Integrated Resource Plan – which is the country's main policy document on energy – only foresees additional electricity imports of 2,600 MW until 2030, probably from Southern Africa. Ethiopia is not even mentioned in the Integrated Resource Plan (Department of Energy 2011). Besides, the outlook for Ethiopian exports to Kenya and Egypt remains uncertain. On the one hand, the 2,000 MW interconnector with Kenya is making progress and on schedule to be commissioned by 2017. Only the prevailing conflicts in the borderlands might delay the project given the overwhelming confluence of shared economic and political interests between Ethiopia and Kenya. On the other hand relationships with Egypt are severely strained, precisely on account of the construction of the GERD. Whilst Egypt is not against the construction of the GERD per se, it nevertheless claims that it should have a stake in at least two major decisions affecting the availability of downstream water: the scheduling each year of when exactly

the reservoir is filled and the handling of the seasonal flows of the Nile River (Davidson and El Wardany 2013).

In fact, the differences of the two countries over the dam are but an additional chapter in the history of their long-sustained competitiveness over harnessing the hydroelectric potential of the Blue Nile. The conflict pits Ethiopia, Sudan and to a lesser extent Uganda against Egypt in a bid to challenge the colonial treaties that in 1929 and 1959 granted the latter privileged access to the resources of the Nile. Egypt still has great leverage in the ongoing negotiations over this, under the framework of the aforementioned Nile Basin Initiative. Yet Ethiopia has managed to secure the support of Sudan and Uganda for the now-proposed revising of each's share in the waters of the Nile. In 2010 it signed a treaty with Kenya, Rwanda, Tanzania and Uganda for the exact same purpose. Ethiopia appears to feel comfortable in pursuing a strategy of construction projects proceeding whilst diplomatic negotiations drag on. Despite its principled refusal to acquire any energy as long as its demands are not met, Egypt may sooner rather than later be forced to come to terms with the GERD however. This point is illustrated by its recent offer to contribute towards the project's funding, documented by the Ethiopian newspaper *Reporter* on 28 May 2014. A major reason for this is that Egypt desperately needs to secure additional sources of energy given that its domestic gas deposits are on the decline. Relatedly, Ethiopia cannot afford to lose Egypt as a customer without jeopardising the financial viability of the whole energy exports scheme for the reasons already mentioned.

Coming back to the smaller but in the near future more realistic international customers for Ethiopian electricity the following considerations are important:

- Djibouti is keen to further tap into cheap Ethiopian power in order to meet its own growing domestic demand. Hence, the existing interconnection might in turn be expanded in the near future, also increasing the chances for the aforementioned link with Yemen. There is, however, no precise plan on how to do this. Nor has the quantity of additional transmissions yet been specified.

- Somaliland is another suitable candidate. Albeit negligible in terms of market size, Ethiopian diplomats are particularly keen on a cross-border link with this neighbouring state in order to boost their political influence on it. The project also makes economic sense. The *Somaliland Sun* reported on 10 April 2014 that electricity tariffs in some towns in Somaliland reach the astronomical figure of $1 per kilowatt-hour, in other words 14 times the price at which Ethiopia is currently selling power abroad.

- Sudan obviously represents a potential destination for additional exports, as transmission lines with it are already in place. Yet as the aforementioned dispute on tariffs has demonstrated, some doubts remain about its reliability as a customer.

- Plans to export power to South Sudan are even more questionable given the ongoing civil strife there. Because of South Sudan's current political instability any long-term commitment made by its government to import electricity from Ethiopia can hardly be taken as reliable.

- According to an article published in the *Financial Times* on 16 February 2014 Rwanda and Tanzania are both eager to import Ethiopian electricity wheeled through Kenya and/or Uganda. For that to materialise the EAPP-sponsored interconnections will have to see the light of day first, a factor that is largely outside the control of Ethiopia.

- The Ugandan government is currently absorbed in trying to overcome the administrative burdens that are preventing the Karuma Hydropower Station from taking off. This power station was initially discussed in 1995 and is now scheduled to reach a capacity of 600 MW. Linking with Ethiopia does not appear to be a priority for Uganda.

- As for the remaining candidates, Burundi and the DR Congo have only expressed a vague interest in importing Ethiopian electricity. Non-existent diplomatic relations with Eritrea, meanwhile, stymie the prospects of exports going there (unless indirectly transported through Sudan).

Beyond exports of electricity, the Ethiopian government is also raising the stakes considerably by pledging to deliver total national electrification by 2023. This goal only seems attainable if efforts at electrification are accompanied by a substantial dose of creative accounting, predicated upon a particular definition of access. Until now Ethiopian authorities have equated access with merely living in an electrified area. Crucial aspects such as the actual number of households connected to the grid or their ability to pay for electricity have hence been largely disregarded. Accordingly, the claim that 6,000 villages had been electrified by 2011 does not necessarily translate into the actual availability of power for all of their inhabitants (World Bank 2012b). Further compounding the problem, villages featuring less than 200 households are often considered ineligible for electrification. Therefore, substantial pockets of the population will in any case remain excluded

from access to electricity but will not be counted as such in government calculations.

Possible Environmental and Financial Pitfalls Ahead

According to the discussion so far, it might appear as if it were only a matter of time before electricity exports flow out of Ethiopia and earnings, conversely, flow in – at least from its neighbouring countries. As I show in this section, there are considerable environmental risks and financial uncertainties involved in Ethiopia's electrification programme though, ones that might threaten its ultimate feasibility. Other legitimate concerns typical for large-scale infrastructure projects – such as massive resettlements, local grievances and potential trade-offs between domestic and foreign constituencies – will not be dealt with here.

To start with, in a country that is more than 80 per cent reliant on hydropower not only deep ecologists fear the consequences of severe droughts like those that hit Ethiopia in 2003 and 2008. The frequency of such droughts is likely to increase because a naturally given tendency for highly variable rainfall is now being intensified by man-made climate change. The World Bank (2014) is also worried about the increasing volatility of rain patterns, as is an international panel of experts mandated to analyse the project design of the GERD. In its report this panel raised a number of issues – ranging from the lack of sensitivity analyses for events associated with climate change, for example evaporation and flood frequency, to the potential reduction in the capacity of the dam due to sediment load. When sediments accumulate at the bottom of the reservoir they reduce the height of the water level and hence the volume of water that can be stored in it. The experts warned that the need to 'stabilize downstream water supply […] may result in the GERD being drawn down to the minimum operating level for about 15 consecutive years' (2013, 36). This would hinder attempts to operate the GERD at its envisaged peak output of 6,000 MW. Comparatively minor geothermal, solar and wind developments might prove insufficient complements in the event of a drought or a persistent reduction in rainfall, calling into question the prospect of Ethiopia being able to offer reliable energy exports. Despite these considerable concerns the Ethiopian government continues to dismiss any form of critical analysis. With regard to Gilgel Gibe III, international non-governmental organisations pointed out in the past that environmental and social impact assessments were done in haste and failed to rigorously assess alternatives, for instance regarding a

chain of smaller dams (Africa Resources Working Group 2009; International Rivers 2009).

The financial challenges look even starker. When completed the GERD will have drained, in the best-case scenario, $4.7 billion from the Ethiopian public coffers. Meeting the need to expand and upgrade the domestic transmission network is forecast to require an investment of $1 billion up until 2015. The interconnector with Kenya will cost $840 million (AfDB 2010; EEPCo 2011). Overall, combined efforts in the domains of power generation, transmission and distribution will compel Ethiopia to mobilise $3.4 billion each and every year for the next decade – an amount that represents roughly one-tenth of its gross domestic product (Foster and Morella 2011).

Until now Ethiopian authorities have deserved praise for their creativity in putting up a variety of funding arrangements for the infrastructures already constructed – not only the AfDB and the World Bank, but also the European Investment Bank and the French and Italian governments have all provided loans for different hydropower schemes. Therefore the electrification scheme remains financially on track. $3.5 billion out of the overall 11 billion required for the works envisaged until 2023 has already been secured (World Bank 2012b). At the same time however, and prompted by an urge to speed up construction, the Ethiopian government has neglected its own procurement legislation. As a consequence multilateral institutions have been driven away from supporting Ethiopia's electrification scheme. For Gilgel Gibe III Ethiopia was forced to turn to China and Italy. The fact that the Italian constructor Salini was awarded a contract without bidding raised many eyebrows, notably after the investigation in Italy of allegations of corruption in that country's previous engagement in the construction of Gilgel Gibe II.

Analogue problems also engulf the GERD, forcing Ethiopia to resort to self-financing; amongst other means by issuing governmental bonds targeted at Ethiopians both at home and abroad. Domestically $367 million has already been raised, officially as voluntary contributions exacted from employees in the public sector – being equivalent in amount to one month's worth of their salary (Abbink 2012). At least according to an article in the *Reporter* on 19 April 2014, awareness-raising campaigns abroad and the mobilisation of Ethiopian embassies have secured a further $250 million from amongst the diaspora. Urged by the Ethiopian Central Bank, domestic banks have acquired bonds to an amount equivalent to 27 per cent of their loan portfolio (Davidson 2014). Chinese loans will be used for the construction of the transmission lines required for the GERD, according to an article that was published by *Tigrai Online* on 25 April 2013.

Such a massive rate of borrowing and expenditure might have its downsides as well. The International Monetary Fund (2011) has warned against heightened inflation, an unsustainable debt profile and the crowding out of private sector financing. Moreover, the EEPCo's loan portfolio amounted to $3.5 billion as of 2012 – with a staggering $350 million therein earmarked annually to go towards the servicing of debt. The losses of the EEPCo in the fiscal year 2016 are estimated to reach 70 per cent of its total revenue (World Bank 2012a, 2012b). The financial situation of the EEPCo might be worsened by too optimistic calculations having been made with regard to the GERD. The aforementioned panel of international experts (2013) predict the GERD's load factor to be low, and highlight the considerable costs of transmission to the main load centre.[4] The latter result from tremendous transmission losses, as indicated by Table 6.2. Bringing these concerns together with the more reasonable estimate of 5,250 MW of peak capacity, the World Bank (2012a) expects a shortfall of $50 to $100 million for the GERD with regard to the according financial calculations of the Ethiopian government. Related to this, connections to Egypt and South Africa are not to be expected within the next 10 years – if, indeed, at all. That will put the financial health of the electrification scheme under further strain, requiring the flexing of a financial muscle that the Ethiopian state will find difficult to grow.

As a consequence of these financial shortcomings the Ethiopian government is likely to be compelled to grant EEPCo a rise in tariffs in order to ensure the full recovery of costs – something poised to trigger a public outcry. Besides, the financial challenges may be further compounded by the budgetary overruns often associated with the building of dams of the Gilgel Gibe III and the GERD type; not in vain large dams have historically incurred a median 27 per cent of additional costs (Ansar et al. 2014). Apart from that, sales to neighbouring countries appear to be persistently falling below estimates: *Africa Review* reported on 15 May 2014 that the Ethiopian minister of water and energy acknowledged that exports to Djibouti and Sudan only amounted to $33 million in the fiscal year 2013–2014, representing 52 per cent of the earnings that had been budgeted. Last but not least, the drive towards universal electrification entails huge costs with uncertain returns. The World Bank accordingly notes that 'it is uncertain […] that electrifying all rural towns and villages over a ten year horizon is economically justified, or represents an ideal allocation of scarce resources in macroeconomic terms' (2006, 2).

4 The load factor of a power station is defined as the average load divided by the maximum load. A low load factor hence indicates that a power station is used much less intensively than it could be. The load centre refers to the major site(s) of electricity consumption.

Conclusion

In this chapter I have illustrated the progress of Ethiopia as it bids to become the powerhouse of East Africa. With the GERD as its flagship energy project, Ethiopia has deployed remarkable capacities and demonstrated a stern determination to push ahead with its plans. The country has had initial success in securing the energy sources required to overcome decades of power scarcity. Ethiopia has also started cashing in from revenue generated by making exports of electricity to two neighbours, Djibouti and Sudan, in a trend that is scheduled to grow exponentially in the near future. The government plans to reach an electricity generation amount of 11,000 MW by 2016 and 37,000 MW by 2037. It believes that the hydropower potential of Ethiopia is 45,000 MW. Around $1 billion is forecast to result from electricity exports each year from 2020 onwards. Going hand-in-hand with this expansion of generation capacities is the sharp increase in access to electricity nationwide, with it being particularly felt in the highlands.

All in all the thrust to expand the power sector is likely to be sustained, wholeheartedly supported as it is by the Ethiopian political élite. However, I have revealed that the success of the whole scheme largely rests upon exports being made to a small set of clients themselves harbouring considerable domestic demands for electricity: Egypt, Kenya and South Africa and possibly also Yemen as well. Djibouti, the DR Congo, Rwanda, Somaliland, South Sudan, Sudan, Tanzania and Uganda constitute probably more realistic markets than distant Egypt and South Africa do, but they all lack substantial demand and are marked by obstacles to receiving Ethiopian electricity of their own kind. Current purchases from Djibouti and Sudan amount to less than anticipated, casting a bleak shadow over the forthcoming analogue operations. I briefly mentioned Europe as potential customer, even though such exports are unlikely to unfold any time soon.

There are also considerable environmental, and especially financial, pitfalls ahead. Because of naturally occurring droughts and the ongoing effects of climate change Ethiopia's hydropower stations are unlikely to continuously reach their envisaged maximum output volumes. The tremendous costs of the electrification scheme – standing at $3.4 billion a year – are difficult to meet. International organisations have warned against the consequences of vast public debt, including the increasing budget deficit of the EEPCo. The situation is rendered even more risky by probably overly optimistic calculations made about construction costs, generation capacities and revenue from electricity exports. Yet so far the variety of funding arrangements, which include partnerships with the AfDB, the World Bank, China, France and Italy,

have provided Ethiopia with a flexibility that – given the sheer size of the electrification scheme being realised – has become crucial for its ultimate success. The Ethiopian government has even been able to induce public servants, national banks and the diaspora to contribute financially to the scheme.

Earlier I excluded three specific issues from my analysis: massive resettlements, local grievances and potential trade-offs between domestic and foreign constituencies. Regarding Ethiopia's electrification scheme, one may speculate that the emphasis on domestic electrification – which runs through all three phases of the scheme – explains why Ethiopians have hitherto not expressed disgruntlement about the export of electricity, as citizens in the Sub-Saharan energy exporters of Ghana, Nigeria and to a lesser extent South Africa have contrariwise done. The emblematic nature of the GERD, conveniently framed as the embodiment of national pride, automatically equates criticism of the electrification scheme with a lack of patriotism. Future research could thus fruitfully take a closer look at the different ways in which legitimacy is obtained for Ethiopia's ambitious electrification scheme.

As suggested at the beginning of this chapter, the forthcoming years might witness an overturning of the nature of Ethiopian exports. If electricity does eventually overtake coffee as the main export product, a one century-long economic cycle will have come to an end. The implications of this not only stem from the potential of electricity generation to facilitate industrialisation, as compared to the export of barely processed coffee beans. By exporting a considerable amount of electricity to East African countries Ethiopia would moreover be in a position to secure a higher degree of both economic and political clout vis-à-vis its neighbouring states. It could aspire to playing a role comparable to the status of regional hegemon currently enjoyed by South Africa in Southern Africa. That being the case, a renewed modernist drive – embodied in the large dams already constructed and the thousands of kilometres of power lines laid – could deliver for Ethiopia's political élite the political and economic capital that railway tracks yielded for the early twentieth century's imperial rulers.

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